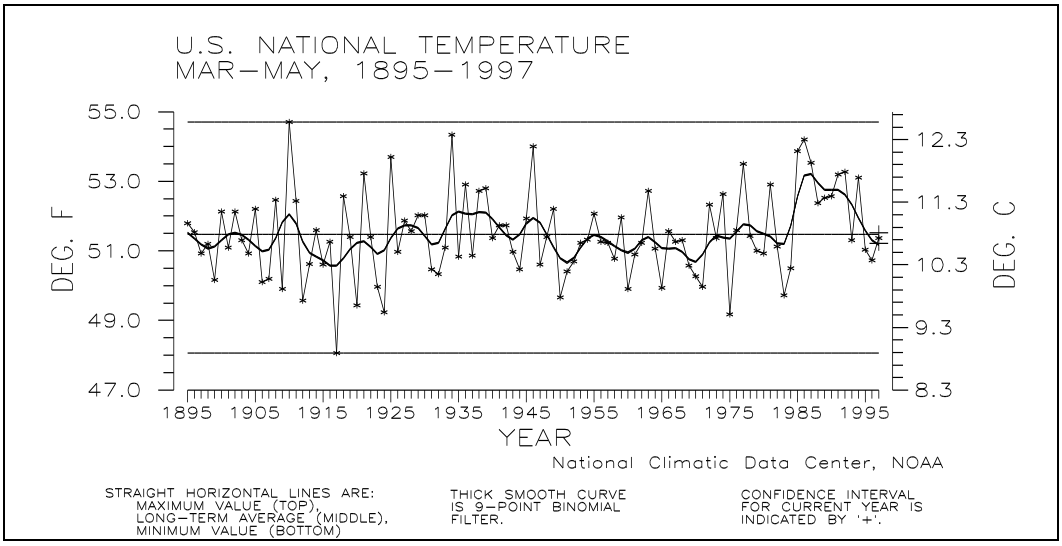
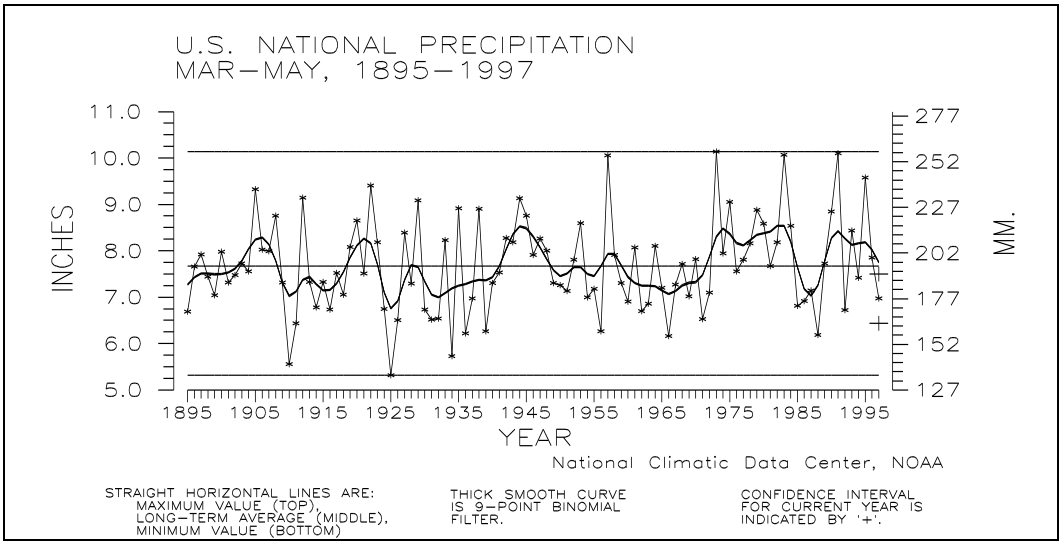
MAY 1997
Includes 1997 Spring Summary

HISTORICAL CLIMATOLOGY SERIES 4-7
Volume 9 Number 5

CLIMATE VARIATIONS BULLETIN





noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION / NATIONAL ENVIRONMENTAL SATELLITE, DATA, AND INFORMATION SERVICE / NATIONAL CLIMATIC DATA CENTER ASHEVILLE, N.C.

This CLIMATE VARIATIONS BULLETIN (CVB) is a preliminary report that puts current monthly climate anomalies into historical perspective using climate databases archived at the National Climatic Data Center (NCDC). It is issued on a monthly basis. Supplemental sections are included which address seasonal and annual perspectives, when appropriate.

Current data are based on preliminary reports from River Forecast Center stations and First and Second Order airport stations obtained from the National Weather Service (NWS) Climate Prediction Center (formerly, Climate Analysis Center), and preliminary tornado statistics obtained from the NWS National Severe Storms Forecast Center. THE CURRENT DATA SHOULD BE USED WITH CAUTION. These preliminary data are useful for estimating how current anomalies compare to the historical record, however the actual values and rankings for the current year will change as the final data arrive at NCDC and are processed.

The following NCDC datasets are used for the historical data: the climate division drought database (TD-9640), the hurricane datasets (TD-9636 and TD-9697), the tornado dataset (STORM DATA), and the monthly station dataset (LCD supplemental files). It should be noted that the climate division drought database consists of monthly data for 344 climate divisions in the contiguous United States. These divisional values are calculated from the 6000+ station Cooperative Observer network.

If you have access to the Internet, copies of the CVB are available via both the NCDC's World Wide Web (WWW) server and the NCDC's anonymous FTP server.

NCDC's WWW server
URL for the CVB: http://www.ncdc.noaa.gov/publications/cvb/cvb.html

NCDC's anonymous FTP server
Machine: ftp.ncdc.noaa.gov
Directory: /pub/data/cvb

If you are a climate researcher and would like to order copies of the historical datasets used to make graphs of the type in this report, call 704-271-4994 or fax a letter to 704-271-4876 or mail a letter to the address given below, ATTN: Research User Services.

All other questions or requests for data should be made by calling 704-271-4800 or sending a fax to 704-271-4876 or by writing to:

National Climatic Data Center, NOAA
Federal Building
151 Patton Avenue, Room 120
Asheville, NC 28801-5001

If you use any of the information from this CVB, please identify "National Climatic Data Center, NOAA" as the source.

UNITED STATES MAY AND SPRING CLIMATE IN HISTORICAL PERSPECTIVE

Richard R. Heim Jr.
William O. Brown
Alan Basist
National Climatic Data Center, NOAA
Global Climate Lab
Federal Building
Asheville, NC 28801 USA

Tables:

Graphics:

Table 1. Precipitation and Temperature Ranks, Based On the Period 1895-1997. 1 = Driest/Coldest, 103 = Wettest/Warmest for May 1997, 103 = Wettest/Warmest for Apr-May 1997, 102 = Wettest/Warmest for Dec 1996-May 1997, 102 = Wettest/Warmest for Jun 1996-May 1997.

Region	May 1997	Apr-May 1997	Dec 1996-May 1997	Jun 1996-May 1997
Precipitation:				
Northeast	61	29	54	98
East North Central	24	14	30	57
Central	59	26	35	70
Southeast	38	57	44	65
West North Central	34	39	72	64
South	36	62	57	92
Southwest	35	62	63	74
Northwest	67	83	102	99
West	10	10	53	52
National	26	35	61	94
Temperature:				
Northeast	5	9	79	61
East North Central	9	13	35	19
Central	3	3	47	18
Southeast	2	3	71	42
West North Central	54	22	40	24
South	10	4	47	29
Southwest	88	53	86	91
Northwest	93	72	85	82
West	102	96	98	101
National	33	9	73	51

Table 2. Extremes, 1961-90 Normals, and 1997 Values For May. It Should Be Noted That the 1997 Values Will Change When the Final Data Are Processed.

Precipitation (Inches)

Region	Driest Value	Driest Year	Wettest Value	Wettest Year	Normal Pcpn	1997 Pcpn
Northeast	.98	1903	7.25	1984	3.79	3.67
East North Central	1.15	1934	6.23	1908	3.29	2.64
Central	1.65	1934	8.03	1995	4.47	4.40
Southeast	.97	1941	7.61	1976	4.21	3.40
West North Central	.65	1934	4.63	1962	2.57	2.12
South	1.90	1988	7.33	1935	4.17	3.44
Southwest	.19	1974	2.31	1992	1.01	.81
Northwest	.30	1924	3.67	1915	1.79	2.12
West	.07	1924	2.75	1915	.73	.30
National	1.78	1934	4.15	1957	2.91	2.52*

* Preliminary Value, Confidence Interval + or - .32 Inches

Temperature (Degrees F)

Region	Coldest Value	Coldest Year	Warmest Value	Warmest Year	Normal Temp	1997 Temp
Northeast	48.7	1917	61.7	1911	55.5	52.0
East North Central	46.8	1907	63.7	1977	56.0	51.1
Central	56.7	1917	69.8	1962	62.8	58.0
Southeast	65.9	1917	74.4	1896	69.3	66.5
West North Central	47.2	1907	62.6	1934	53.7	53.2
South	65.1	1907	75.3	1896	70.2	67.9
Southwest	51.7	1917	64.3	1934	58.8	61.3
Northwest	47.7	1896	58.5	1958	52.3	56.2
West	53.5	1977	65.6	1992	59.6	65.2
National	55.7	1917	65.1	1934	60.7	60.0*

* Preliminary Value, Confidence Interval + or - .3 Deg. F.

Table 3. Temperature and Precipitation Rankings for Mar-May 1997, Based on the Period 1895-1997. 1 = Driest/Coldest, 103 = Wettest/Hottest.

Region	Precipitation	Temperature
Northeast	43	18
East North Central	12	25
Central	36	16
Southeast	34	45
West North Central	30	46
South	58	21
Southwest	25	84
Northwest	93	81
West	5	100
National	26	54

Table 4. Extremes, 1961-90 Normals, and 1997 Values For Mar-May

Precipitation (Inches)

Region	Driest Value	Driest Year	Wettest Value	Wettest Year	Normal Pcpn	1997 Pcpn
Northeast	5.65	1915	16.86	1983	10.35	9.57
East North Central	3.82	1934	11.66	1991	7.81	5.57
Central	6.98	1941	18.55	1927	12.34	10.86
Southeast	6.77	1914	18.29	1980	12.48	10.98
West North Central	2.22	1934	7.57	1995	5.21	4.47
South	5.89	1925	17.04	1957	9.98	10.07
Southwest	1.30	1972	6.62	1941	2.86	2.37
Northwest	2.13	1924	9.41	1993	6.48	8.21
West	.93	1909	10.15	1995	4.18	1.57
National	5.32	1925	10.14	1973	7.76	6.97*

* Preliminary Value, Confidence Interval + or - .53 Inches

Temperature (Degrees F)

Region	Coldest Value	Coldest Year	Warmest Value	Warmest Year	Normal Temp	1997 Temp
Northeast	40.0	1926	49.4	1921	44.4	42.5
East North Central	37.8	1950	49.9	1977	43.3	40.9
Central	48.6	1960	57.7	1977	53.1	51.0
Southeast	59.0	1960	65.9	1908	62.0	62.0
West North Central	36.9	1917	48.0	1910	42.6	41.6
South	57.7	1931	65.4	1963	62.2	60.9
Southwest	44.6	1917	55.4	1934	50.2	51.8
Northwest	40.4	1955	52.0	1934	45.3	47.0
West	48.9	1896	59.1	1934	52.6	56.5
National	48.1	1917	54.7	1910	51.6	51.4*

* Preliminary Value, Confidence Interval + or - .2 Deg. F.

Table 5.
Statistics for Selected River Basins: Precipitation Ranking for Oct-May 1996-97, Where Rank of 1 = Driest, 102 = Wettest, Based on the Period 1895 to 1997; Areal Percent of the Basin Experiencing Severe or Extreme Long-Term (Palmer) Drought, and Areal Percent Of the Basin Experiencing Severe or Extreme Long-Term (Palmer) Wet Conditions, as of May 1997.
River Basin Regions as Defined by the U.S. Water Resources Council.

River Basin	Precipitation Rank	% Area Dry	% Area Wet
Missouri Basin	52	.0%	35.9%
Pacific Northwest Basin	102	.0%	63.6%
California River Basin	68	49.7%	.0%
Great Basin	71	5.8%	.0%
Upper Colorado Basin	90	.0%	69.7%
Lower Colorado Basin	49	46.6%	.0%
Rio Grande Basin	66	.0%	5.4%
Arkansas-White-Red Basin	52	.0%	4.5%
Texas Gulf Coast Basin	60	.0%	.0%
Souris-Red-Rainy Basin	68	.0%	16.9%
Upper Mississippi Basin	58	.0%	7.2%
Lower Mississippi Basin	80	.0%	8.5%
Great Lakes Basin	77	.0%	4.1%
Ohio River Basin	46	.0%	.0%
Tennessee River Basin	73	.0%	.0%
New England Basin	73	.0%	10.2%
Mid-Atlantic Basin	69	.0%	2.6%
South Atlantic-Gulf Basin	51	.0%	.0%

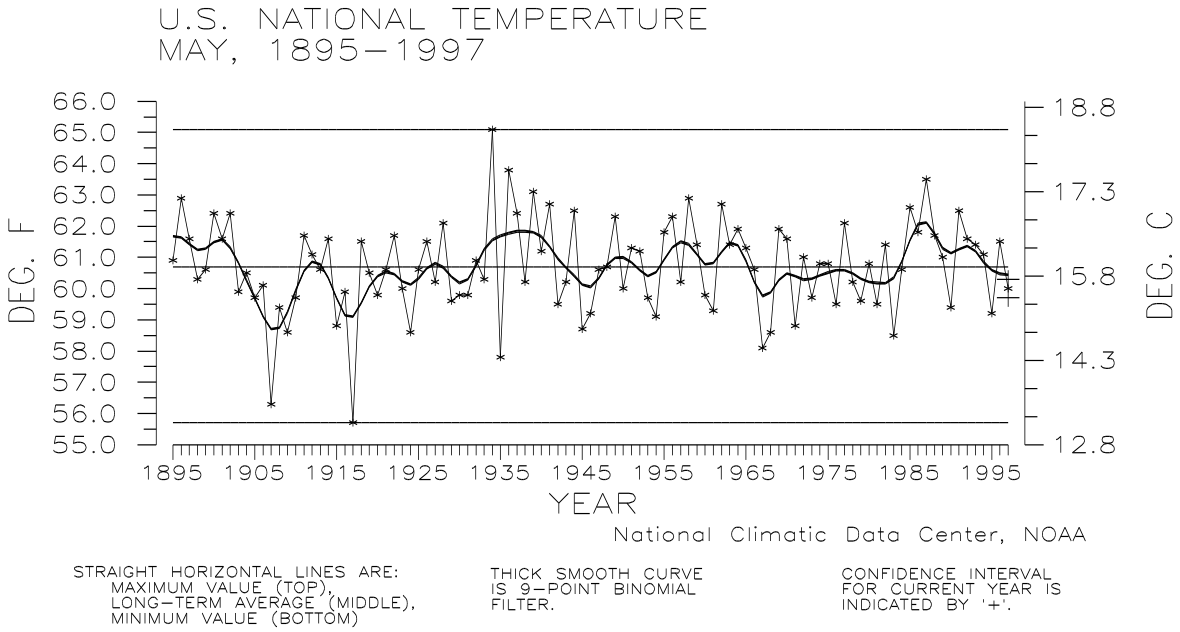


Figure 1. Preliminary data for May 1997 indicate that temperature averaged across the contiguous United States was below the long-term mean, ranking as the 33rd coolest May since 1895. One-fifth (20.0%) of the country averaged much warmer than the long-term mean, while a little over a third (37.6%) averaged much colder.

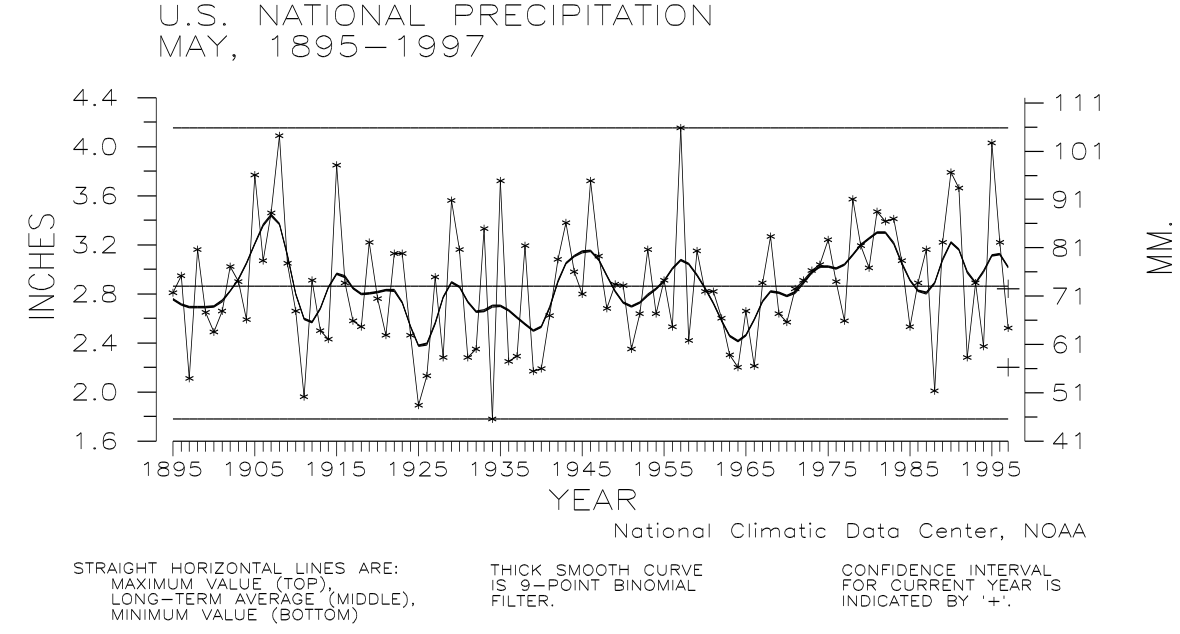


Figure 2. Preliminary data for May 1997 indicate that precipitation averaged across the contiguous United States was below the long-term mean, ranking as the 26th driest May since national statistics begin in 1895. A tenth (8.8%) of the country averaged much drier than the long-term mean, while about two percent (1.8%) averaged much wetter.

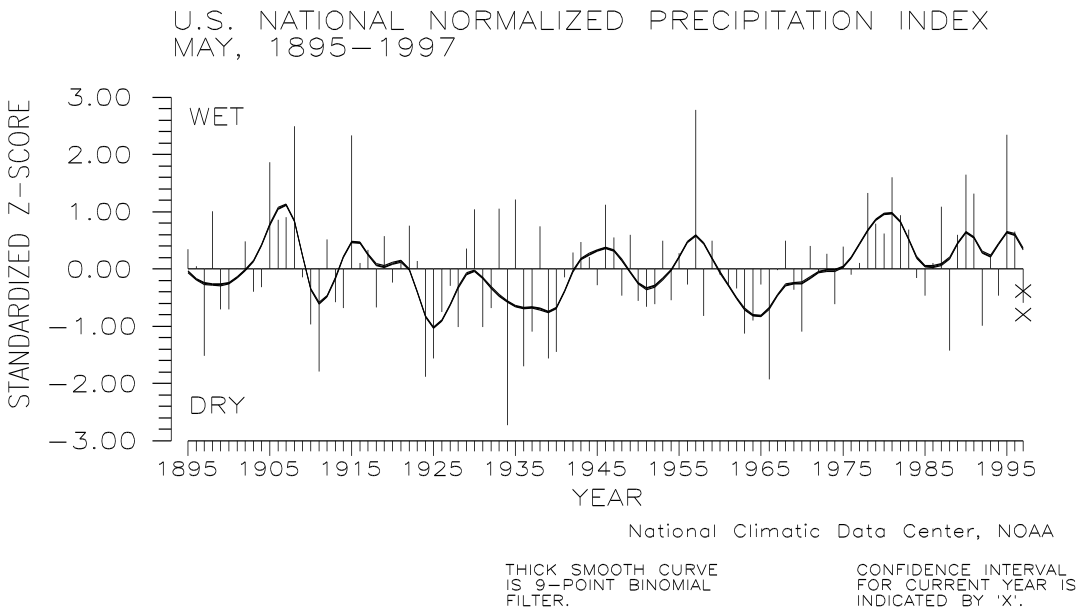


Figure 3. The preliminary national standardized precipitation index ranked May 1997 as the 29th driest May on record. This index was computed by first standardizing each divisional precipitation value using the gamma distribution over 1931-90, then area-weighting the divisional indices and normalizing over the period of record. It shows more accurately how precipitation across the country compares to the local normal (60-year average) climate.

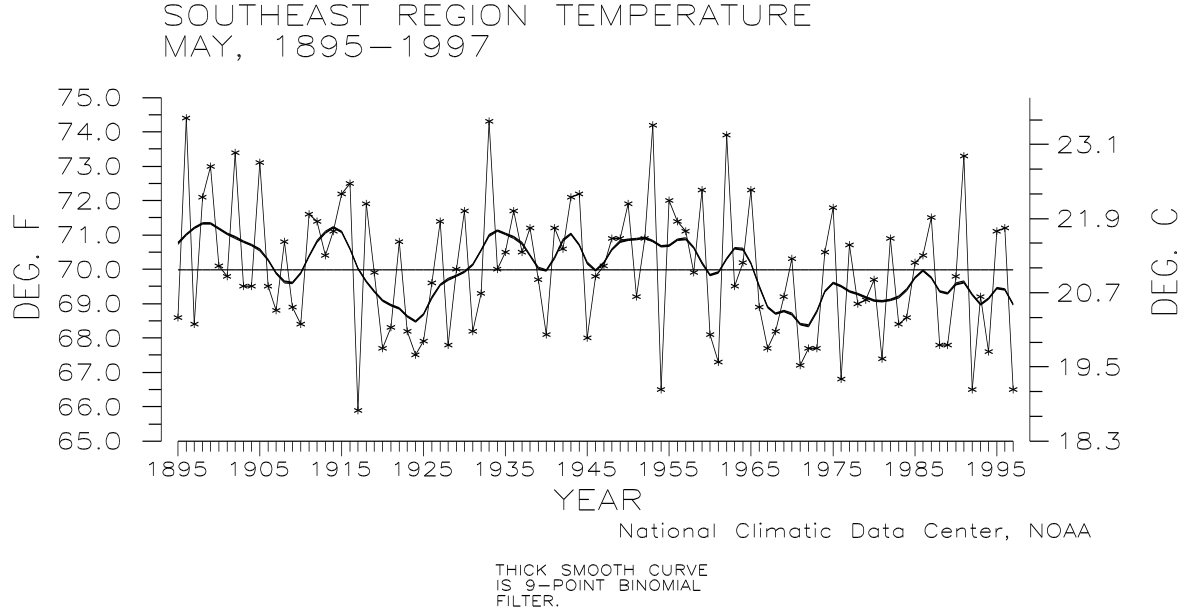


Figure 4. Preliminary data indicate that the Southeast region had the second coldest May on record during 1997. The smooth curve averages out the short-term variations and suggests that a shift to cooler patterns occurred in the mid-1960's.

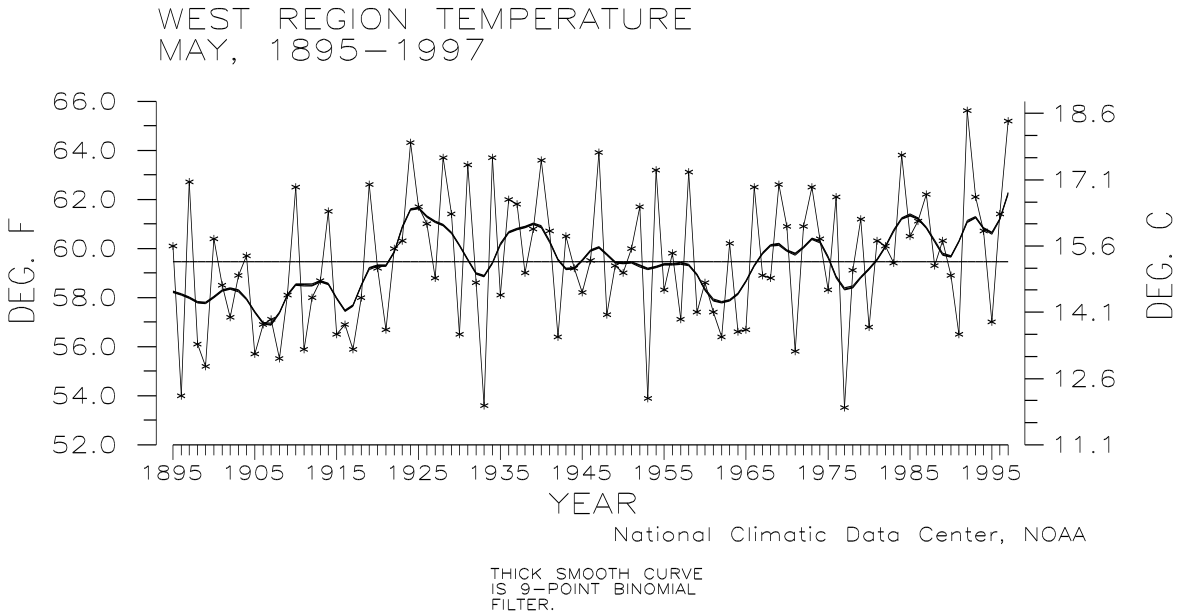


Figure 5. Preliminary data indicate that the West region had the second hottest May on record in 1997. Near to much above normal temperatures have dominated the May recording during the last 15 years in this region, with recent years showing an increase in year-to-year May variability.

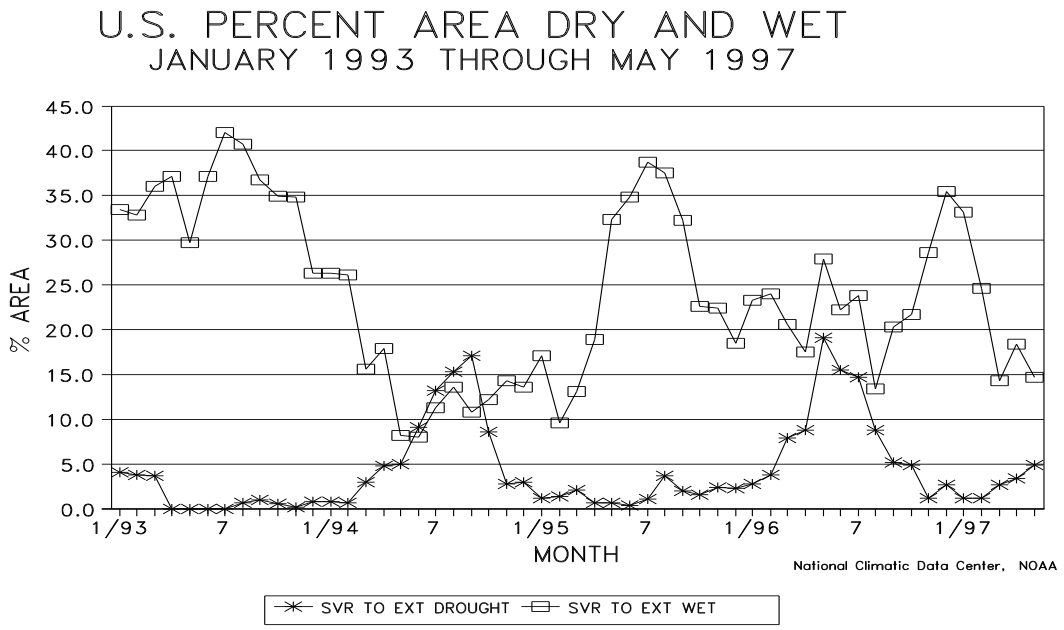


Figure 6. Long-term drought coverage (as measured by the Palmer Drought Index) increased steadily during 1997 to about 5% of the contiguous U.S. by the end of May. The percent of the country experiencing long-term wet conditions remained fairly steady during the spring months at about 15%. The core drought areas were the Desert Southwest to central California, and the core wet areas stretched from the Pacific Northwest to the northern Plains.

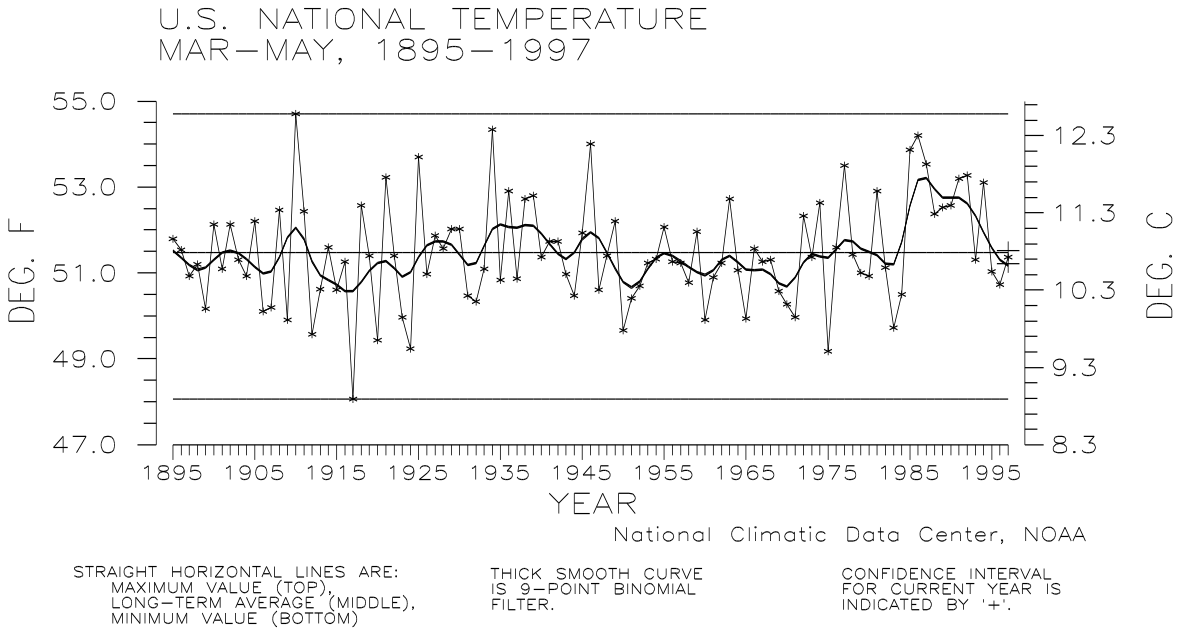


Figure 7. Preliminary data for spring (March-May) 1997 indicate that temperature averaged across the contiguous United States was near the long-term mean, with Spring 1997 ranking as the 50th warmest spring in the 103-year record. One-eighth (12.5%) of the country averaged much warmer than the long-term mean, while about one-sixth (17.1%) averaged much colder. The last 3 springs show a marked departure from the unusual warmth of the previous 10 springs.

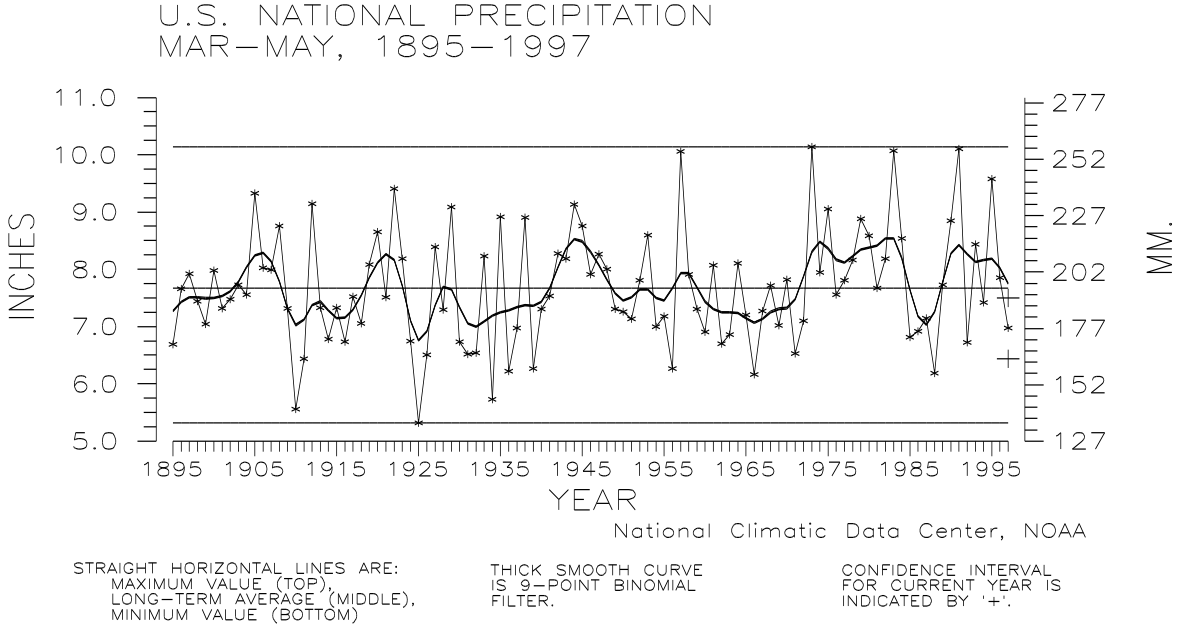


Figure 8. Based on preliminary data averaged across the contiguous United States, Spring 1997 ranked as the 26th driest spring in the 103-year national record. About one-seventh (15.1%) of the country averaged much drier than the long-term mean, while 6.5% averaged much wetter.

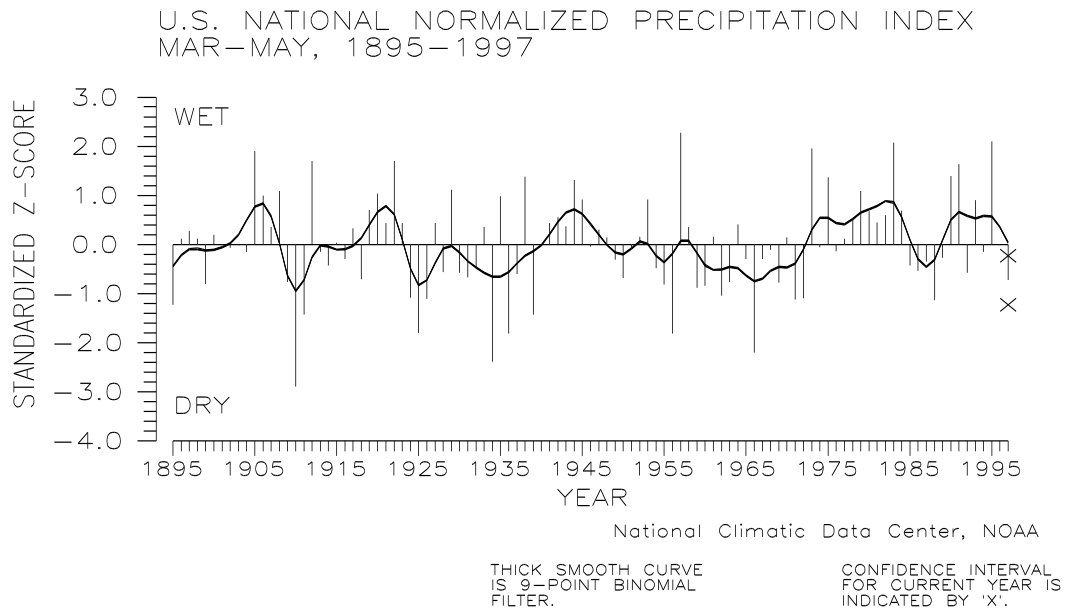


Figure 9. The preliminary national standardized precipitation index ranked Spring 1997 as the 23rd driest spring on record. This index shows more accurately how precipitation across the country compares to the local normal (60-year average) climate.

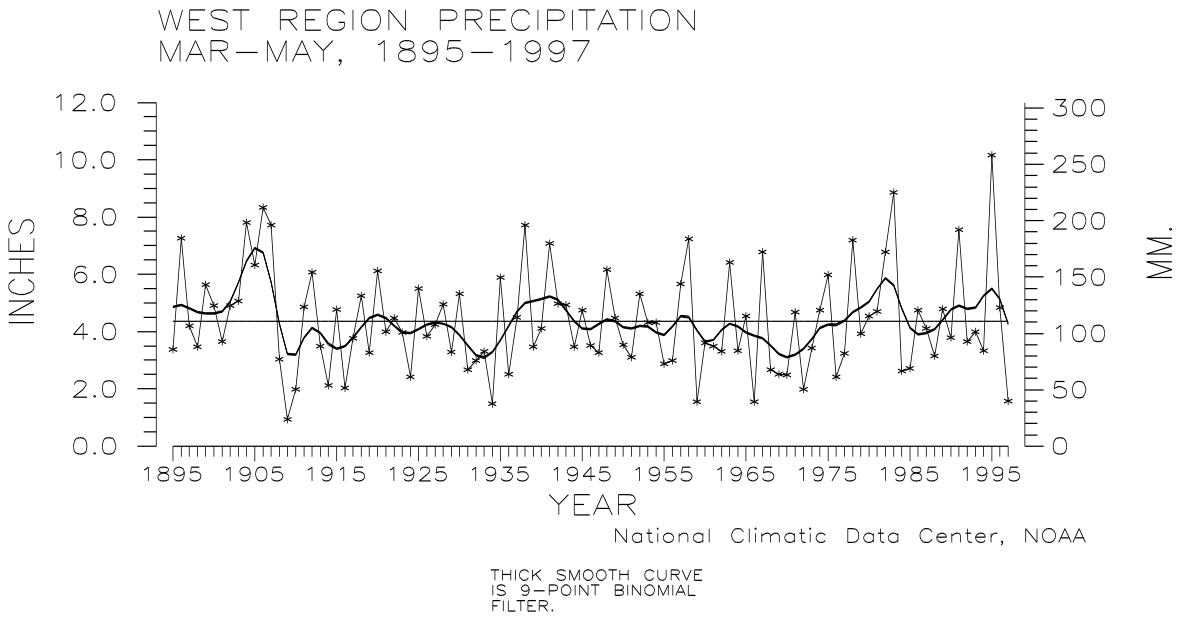


Figure 10. Preliminary data indicate that the West region had the fifth driest spring on record during 1997.

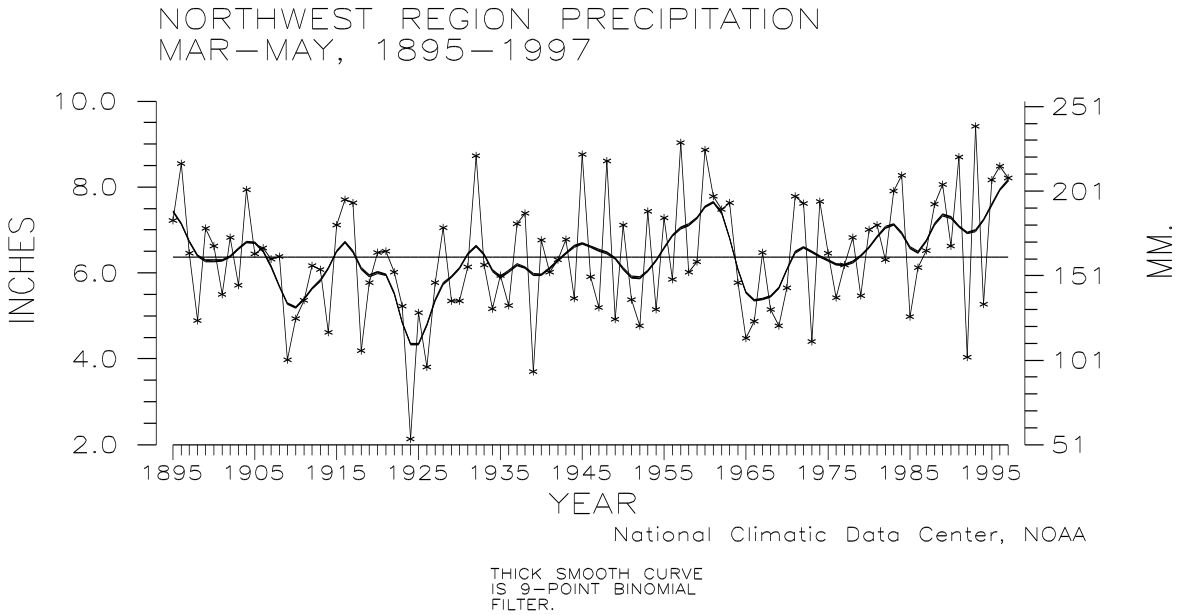


Figure 11. Preliminary data rank Spring 1997 as the eleventh wettest spring on record for the Northwest region. Unusually wet springs have dominated the last ten years in this region.

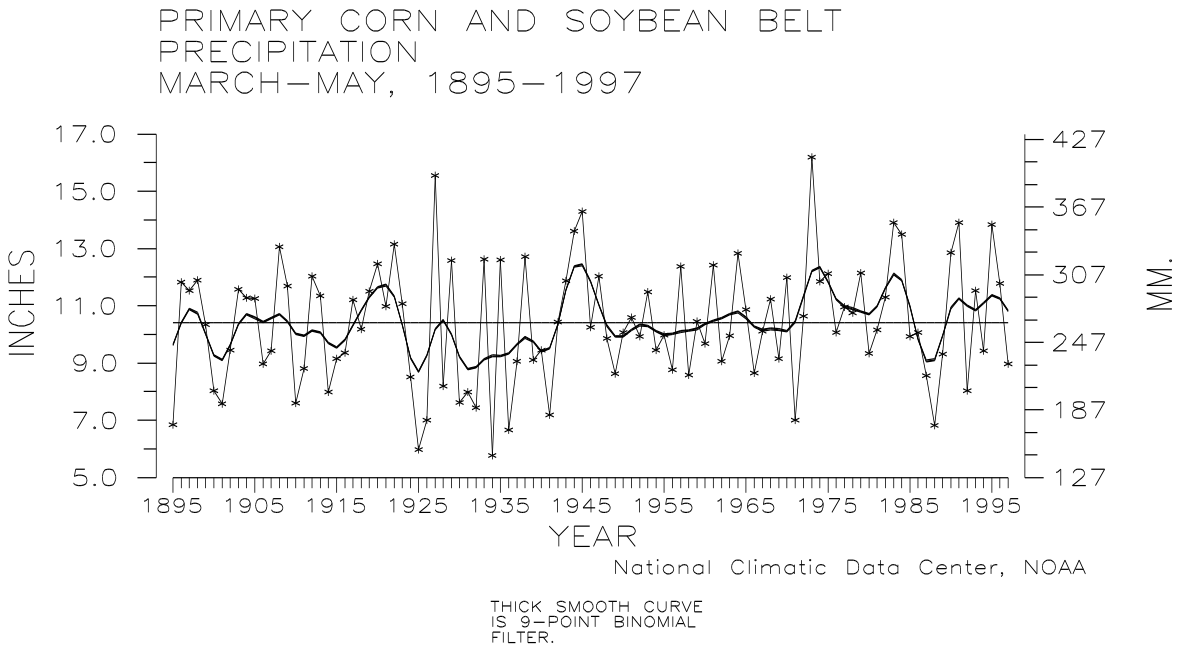


Figure 12. Preliminary data indicate that precipitation averaged across the Primary Corn and Soybean agricultural belt was below the long-term mean for Spring 1997.

MAY 1997 STATEWIDE RANKS

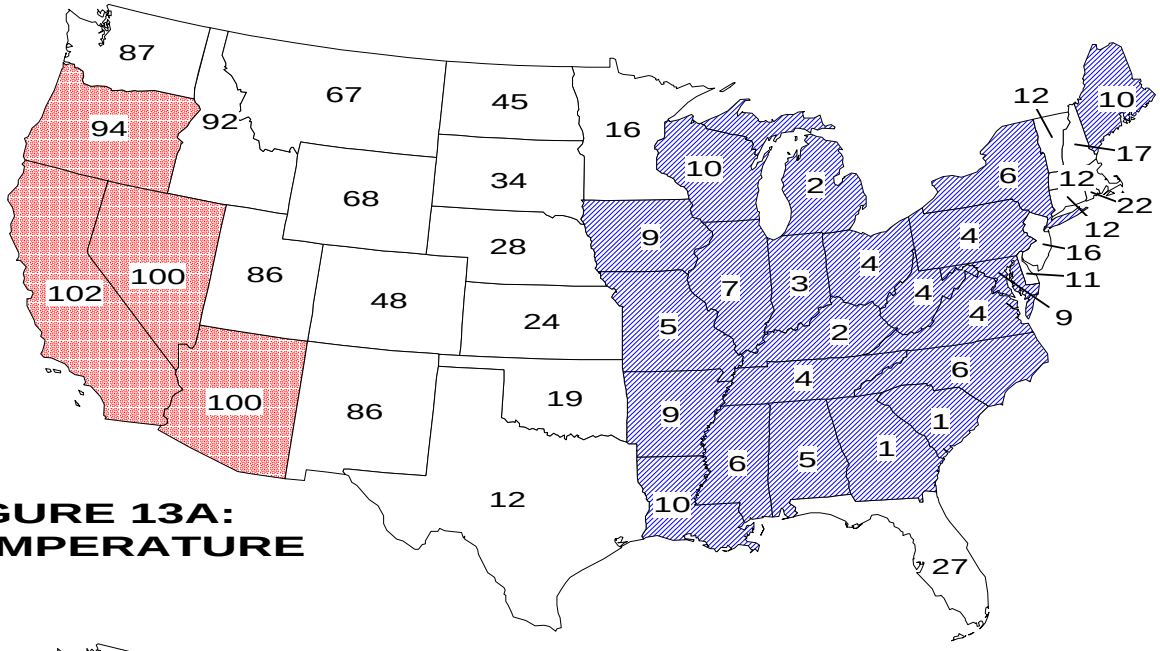


FIGURE 13A: TEMPERATURE

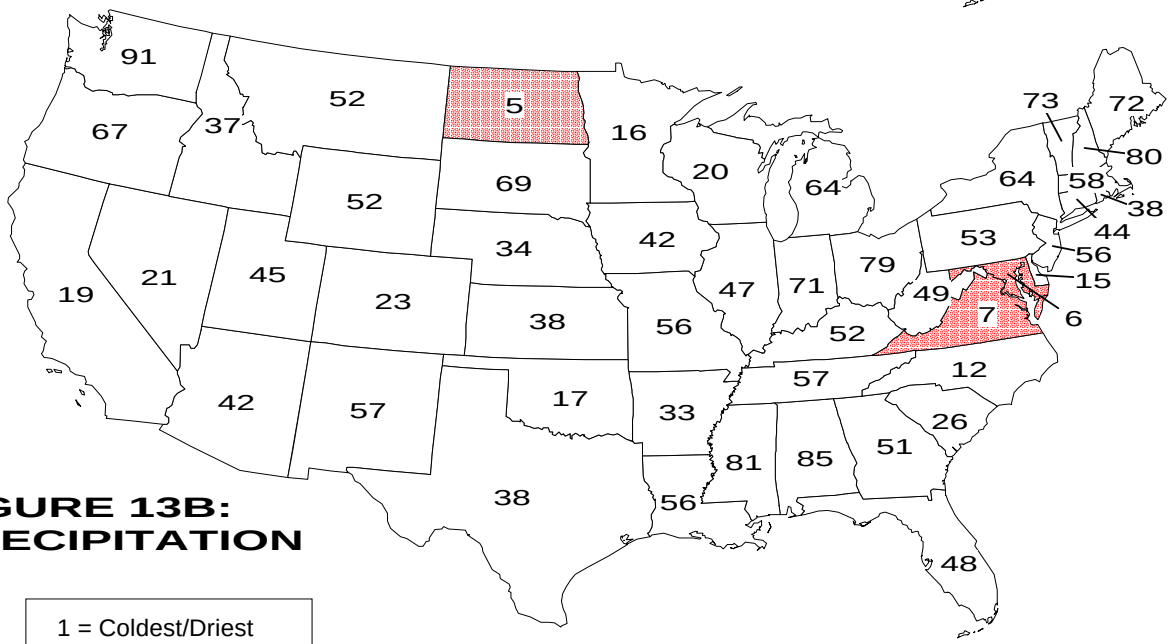


FIGURE 13B: PRECIPITATION

1 = Coldest/Driest
103 = Warmest/Wettest

National Climatic Data Center, NOAA

Temperature and Precipitation Ranks for the contiguous United States. Each state is ranked based on its data from 1895-1997. States having a rank of top ten coldest or driest (rank 1-10) or top ten warmest or wettest (rank 94-103) are shaded.

SPRING (MAM) 1997 STATEWIDE RANKS

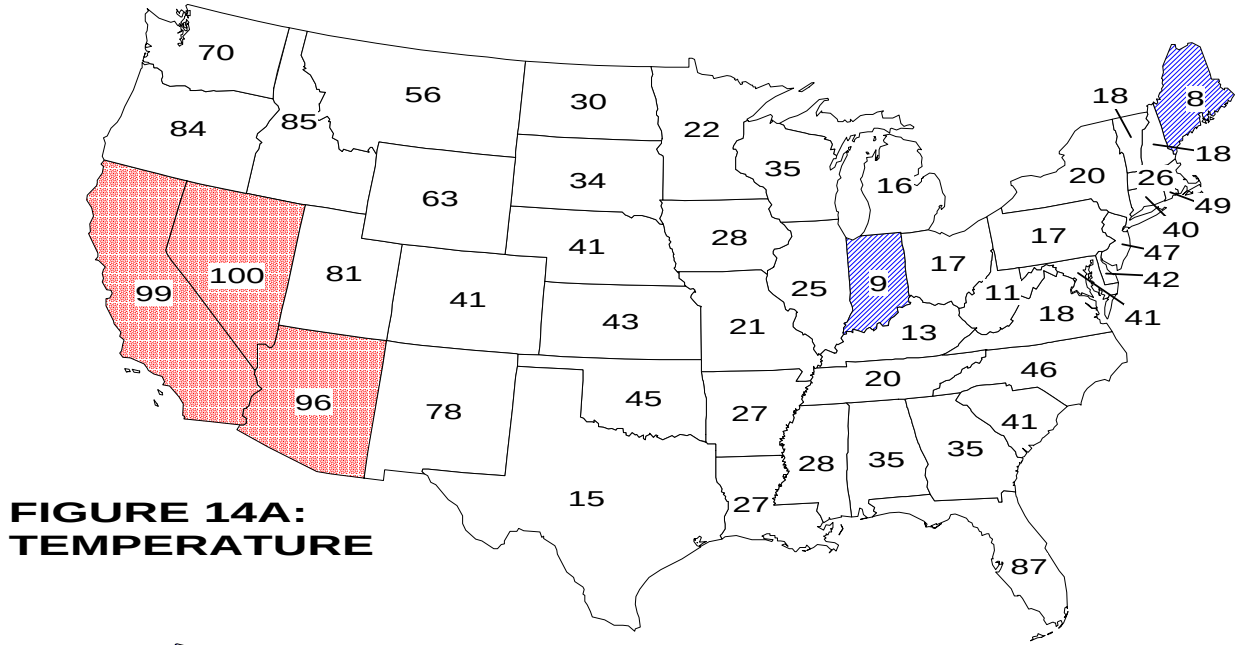


FIGURE 14A: TEMPERATURE

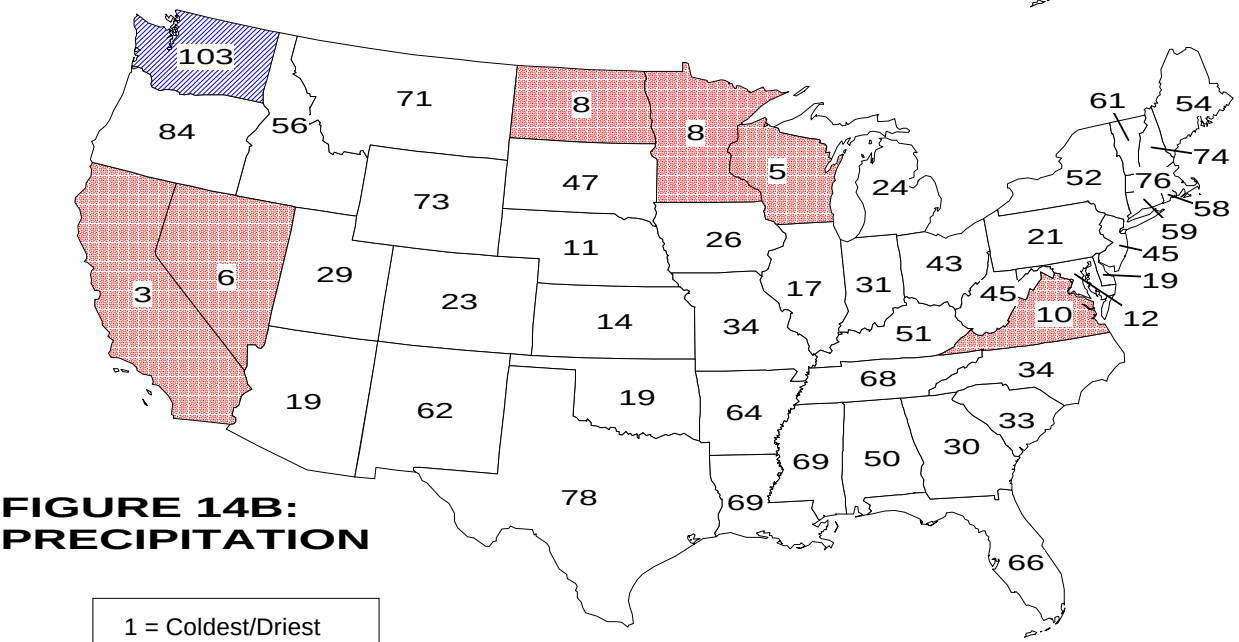


FIGURE 14B: PRECIPITATION

1 = Coldest/Driest
103 = Warmest/Wettest

National Climatic Data Center, NOAA

Temperature and Precipitation Ranks for the contiguous United States. Each state is ranked based on its data from 1895-1997. States having a rank of top ten coldest or driest (rank 1-10) or top ten warmest or wettest (rank 94-103) are shaded.

Figure 13A maps the May 1997 preliminary temperature ranks for the 48 contiguous states. A pronounced ridge west-trough east pattern in the general circulation was indicated by the extreme temperature ranks of the states at the ends of the country. Four western states ranked in the top ten warmest category of the historical distribution, while 22 states along the Mississippi River and eastward ranked in the top ten coldest category. Two states (GA and SC) had the coldest May in the 103-year record, based on preliminary data.

The May 1997 preliminary precipitation ranks (Figure 13B) showed a variable pattern across the Lower 48 States. Three states (MD, ND, and VA) ranked in the top ten driest category.

It should be noted that these monthly state categorical precipitation ranks are preliminary and should be used with considerable caution due to the high variability of precipitation on a small space and time scale.

Spring (March-May) 1997 statewide temperature and precipitation ranks are shown in Figures 14A and 14B. The preliminary temperature pattern (Figure 14A) shows a pattern reflecting a warm ridge in the western U.S. and a cool trough in the eastern U.S., like the May temperature pattern, although the spring temperature ranks generally are not as extreme in the east. Three western states (AZ, CA, and NV) ranked in the top ten warmest category, while two states (IN and ME) ranked in the top ten coldest category.

The preliminary spring precipitation ranks (Figure 14B) showed six states from the Southwest, North Central, and Mid-Atlantic areas (CA, MN, NV, ND, VA, and WI) ranking in the top ten driest category, and only one state (WA) in the top ten wettest category.

It should be emphasized that all of the temperature and precipitation ranks on these maps and in the tables are based on preliminary data. The ranks will change when the final data are processed.

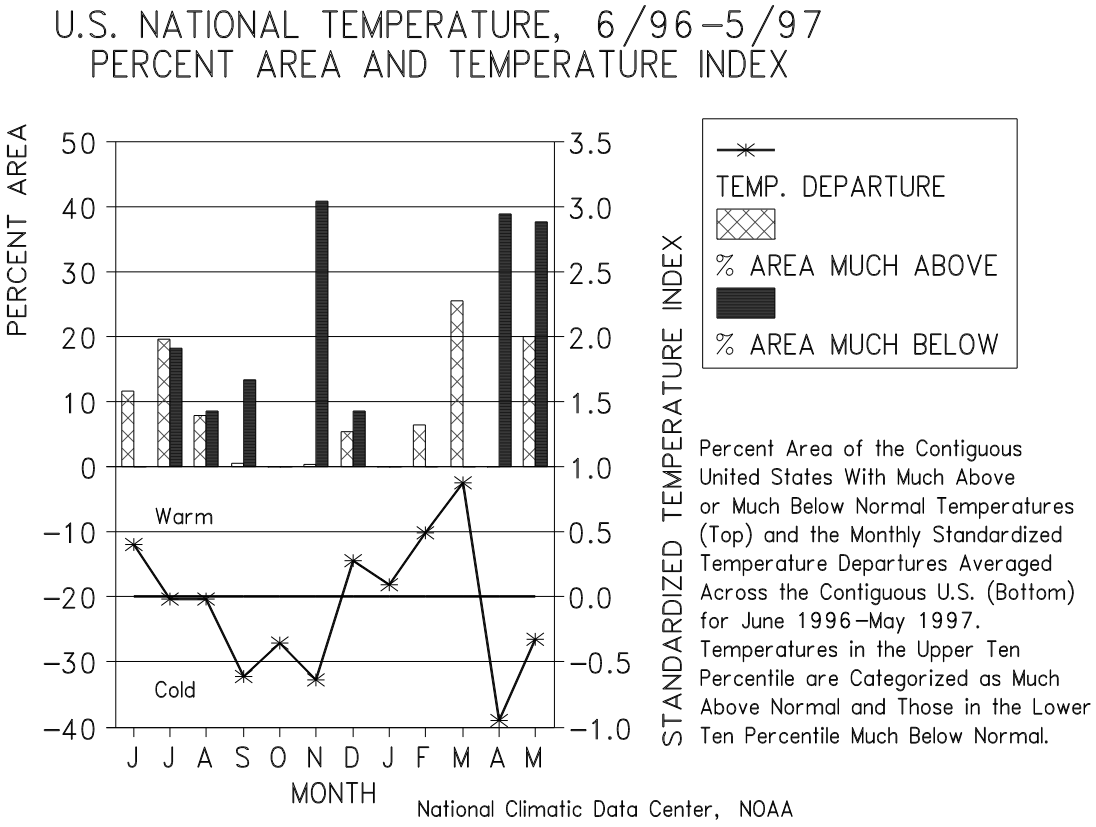


Figure 15. Monthly temperatures across the contiguous United States for each of the last twelve months reveal a pattern of extremes, both across space and time. Temperatures averaged across the country and standardized into a temperature index, indicate that the Fall months in 1996 (September-November) averaged below-normal, while the first four months of 1997 showed a general trend toward warm anomalies. The last two months (April and May 1997) were unusually cold for the nation overall. Both April and May had over a third of the country in the much colder than normal category. In this figure, “normal” refers to the 1931-90 mean.

STATEWIDE RANKS - 1997 TEMPERATURE

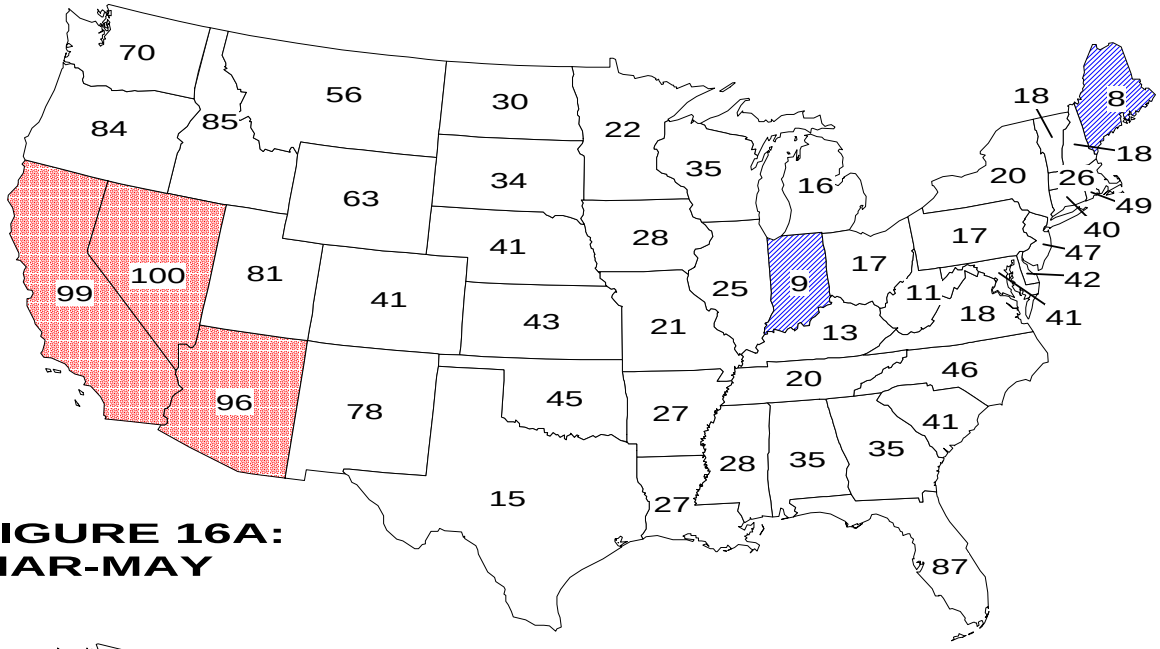


FIGURE 16A: MAR-MAY

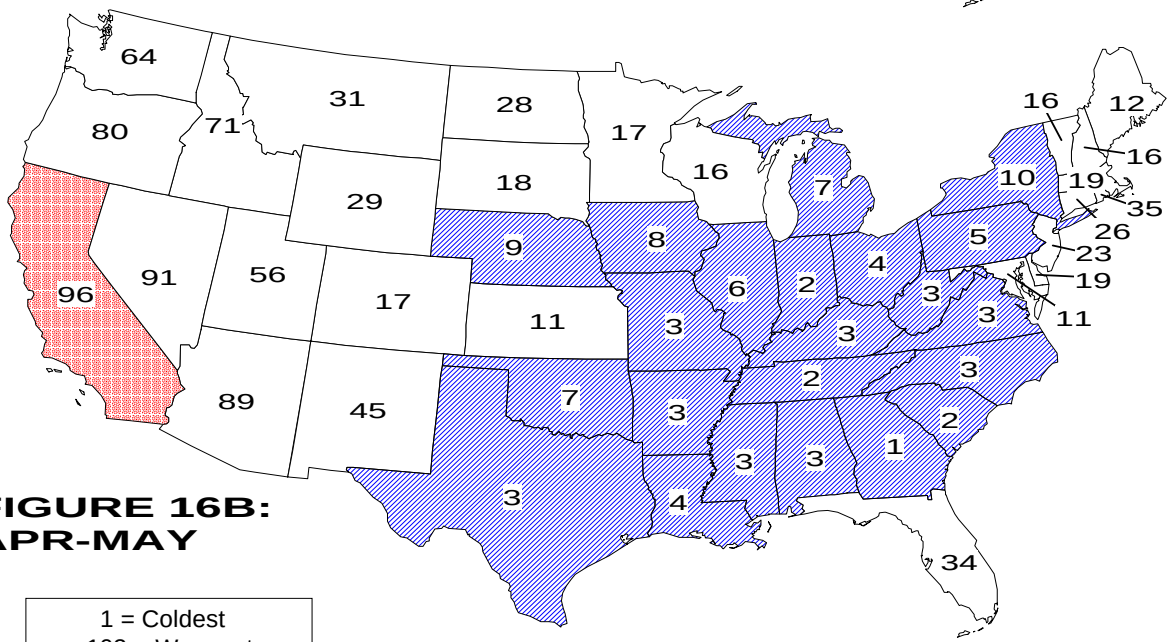


FIGURE 16B: APR-MAY

1 = Coldest
103 = Warmest

National Climatic Data Center, NOAA

Temperature Ranks for the contiguous United States.
Each state is ranked based on its data from 1895-1997.
States having a rank of top ten coldest (rank 1-10) or
top ten warmest (rank 94-103) are shaded.

As noted in Figure 15, April and May 1997 averaged much colder than normal for the nation as a whole. That figure also shows that March 1997 was unusually warm. The March warmth affected the Spring statewide temperature pattern (see Figures 14A and 16A), reducing the magnitude of the cold ranks of many eastern states. The temperature pattern for the cold two-month period, April-May 1997, reveals unusually cold state temperature ranks over much of the nation east of the Rockies (Figure 16B), with 22 states, including three in the Great Plains, ranking in the top ten coldest category of the historical distribution.

It should be emphasized that all of the temperature ranks on these maps and in the tables are based on preliminary data. The ranks will change when the final data are processed.

MONTHLY MEAN TEMP. ANOM. MAY 1997

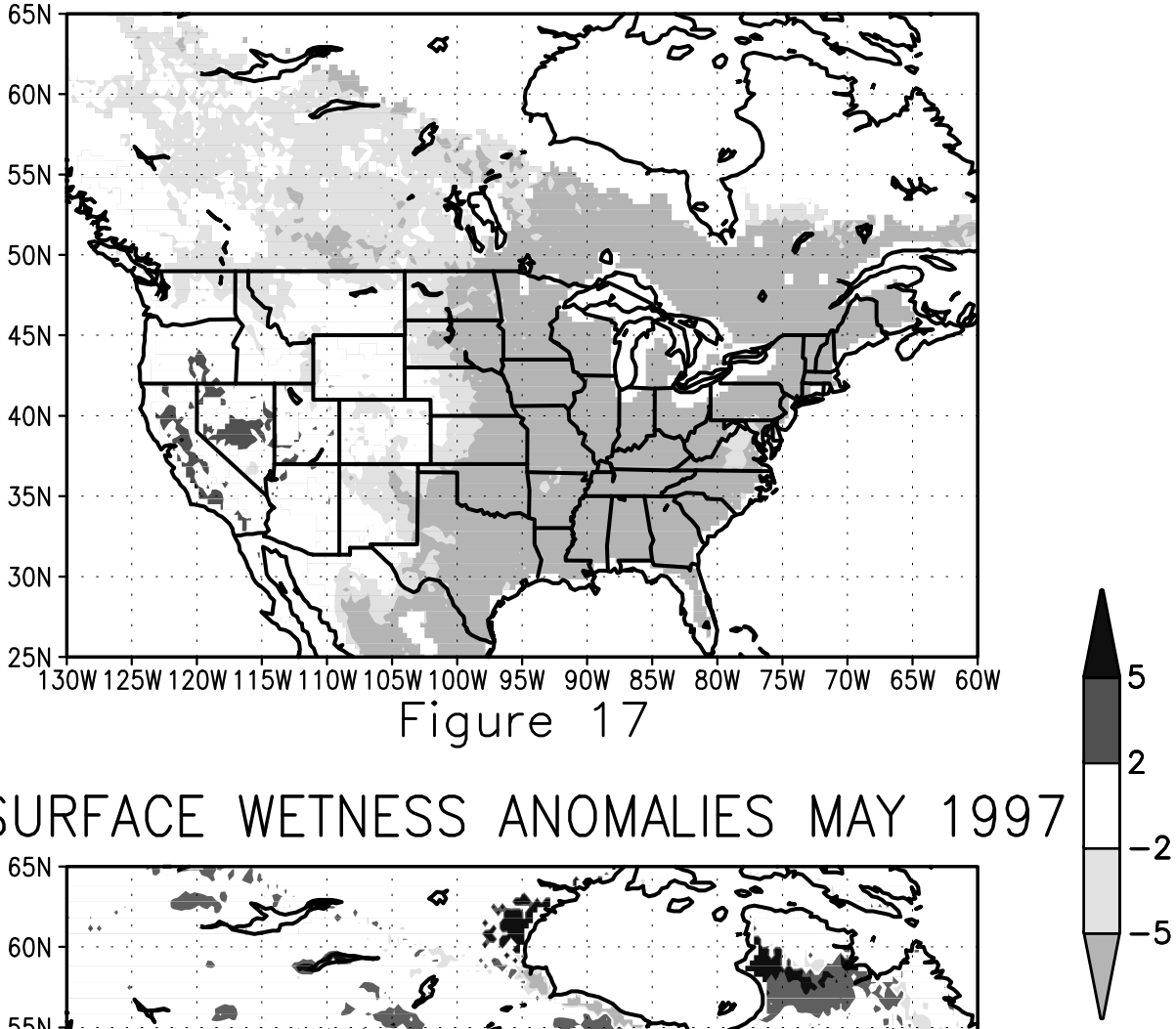


Figure 17

SURFACE WETNESS ANOMALIES MAY 1997

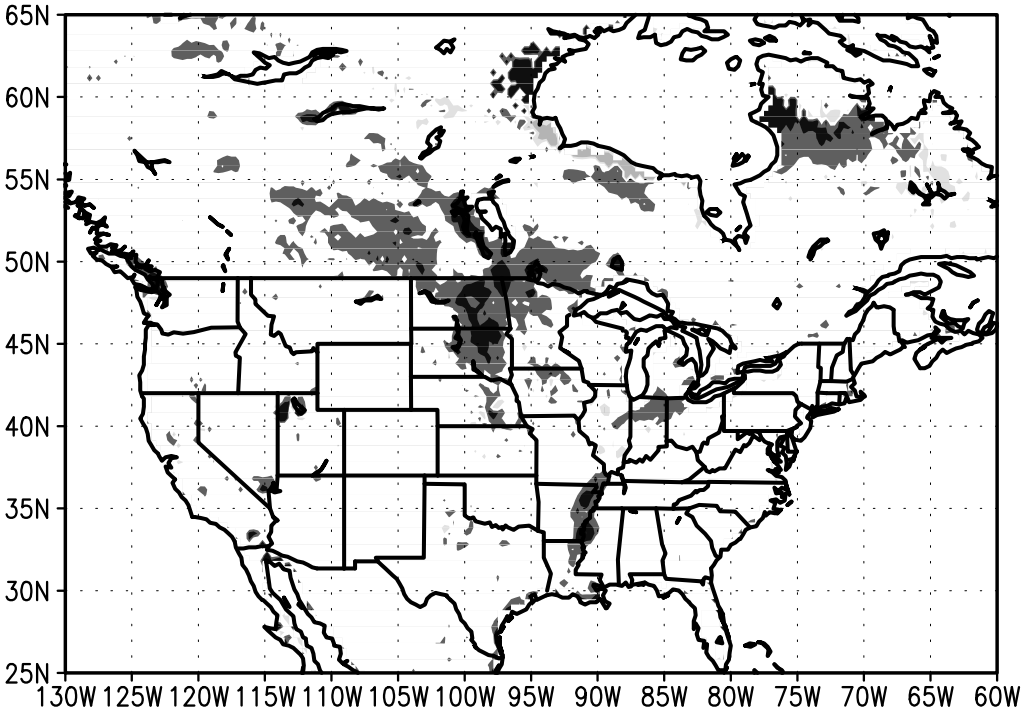


Figure 18

Figure 17 shows the mean monthly temperature anomalies for the month of May 1997. The field is derived from the special sensor microwave imager (SSMI), a polar orbiting satellite flown by the defense meteorological satellite program. Microwave energy is able to penetrate stratiform and fair weather clouds, which allows the satellite to receive a signal from the surface under nearly all sky conditions. This series of SSMI instruments has been flown operationally since 1987, providing a 10-year climatology from which monthly anomalies have been derived. The temperature product is based on an algorithm that corrects for surface emissivity (the efficiency at which an object radiates energy at a particular wavelength), since different surface characteristics produce variable emissivities. Unfortunately, the algorithm is not able to identify the emissivity when snow covers the surface. Therefore, snow cover is first identified by its unique signature and these pixels are removed from the analysis. During May 1997 much of northern Canada and the mountains of western North America are still covered by snow, and no anomalies are derived for these areas. The temperature anomaly pattern in this figure shows below normal temperatures over the eastern half of the continent, and these values exceed 5ºC (9ºF) over much of this area. Weaker cold anomalies also spread into southwestern Canada. In contrast, above normal temperatures covered the southwestern U.S., where a ridge of high pressure dominated during the month.

Figure 18 shows the mean monthly surface wetness anomalies for the month of May 1997. The field is derived from the special sensor microwave imager (SSMI). The multiple wavelengths observed by this instrument are used to identify the quantity of water on the surface. As water accumulates on the surface, the radiance at the longer wavelengths decreases relative to the radiance observed at the shorter wavelengths. This relationship (slope) is translated into a wetness index. During May 1997, melting of the above normal snowpack in the center of the continent produced positive wetness anomalies. There was also above normal wetness around much of Hudson Bay and on the western side of the lower Mississippi River valley. Below normal wetness was limited to the southern border of Hudson Bay, where the snow was melting later than usual.